Providing CEOs With Opportunities to Cheat: The Effects of Complexity-Based Information Asymmetries on Financial Reporting Fraud

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Opportunities for financial reporting fraud arise because of information asymmetries—often labeled "lack of transparency"—between top managers and their diverse shareholders. We evaluate the relative contributions of information asymmetries arising from industry-level and firm-level complexities to the likelihood of top managers committing financial reporting fraud. Using a sample of 453 matched pairs of firms that have and have not been identified as having committed financial reporting fraud, we found that information asymmetries arising from industry- and firm-level complexities increase the likelihood of financial fraud. Moreover, more CEO stock options increase the likelihood of fraud when industry complexity is high, while aggressive monitoring by the audit committee reduces the likelihood of reporting fraud when firm-level complexity is high.

Keywords: *agency theory; compensation; bonuses and benefits; boards of directors*

Chief executive officers (CEOs) of well-known U.S. firms such as WorldCom (Farzad, 2005), Tyco International (Eichenwald, 2005), and Adelphia Communications (Fabrikant, 2005) have been convicted of financial reporting fraud. Likewise, international firm CEOs

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such as Calisto Tanzi of Italy's Parmalat (BBC News, 2008) and Ramalinga Raju of India's Satyam Computer Services have been accused of or admitted to reporting fraudulent financial information (Timmons & Wassener, 2009). The societal cost of this worldwide spate of financial reporting fraud has led researchers and regulators to call for a fundamental reexamination of corporate governance and regulation (e.g., O'Connor, Priem, Coombs, & Gilley, 2006; Paulson, 2007; Zhang, Bartol, Smith, Pfarrer, & Khanin, 2008).

Financial reporting fraud requires three simultaneous circumstances: the opportunity to deceive, a motive for doing so, and willingness on the part of the perpetrator (Snyder, Priem, & Harris, 2009). Opportunity is foremost among these circumstances, because without an opportunity even the most highly motivated and willing potential perpetrator cannot commit fraud. In short, opportunity is a necessary precondition for fraud. Agency theorists have shown that the CEO role is especially conducive to such opportunities, because the widespread separation of ownership from firm control contributes to goal and information asymmetries between the CEOs who control firms and their shareholders (Berle & Means, 1932). Given divergence in the goals of top managers (as agents) and those of shareholders (the principals), without intervention CEOs have the opportunity to engage in self-serving behaviors detrimental to shareholders (1) because the CEOs know more about their firms' resources and operations than do their shareholders and (2) because the relationship between CEOs' behaviors and the resulting outcomes often is not clearly visible to the dispersed shareholders (Berle & Means, 1932; Jensen & Meckling, 1976; Zajac & Westphal, 1994). When shareholders lack such key information, CEOs are subject to moral hazard because they can engage in self-serving behavior with relative impunity (Richardson, 2000). CEO-shareholder information asymmetry, therefore, provides CEOs with the opportunity to engage in detrimental actions ranging from simple shirking, to enjoying unnecessary perquisites, to eschewing high-return high-risk strategies, to our focus—financial reporting fraud.

Financial reporting fraud by CEOs represents an arguably distinct escalation of detrimental behavior when compared to performance-reducing shirking or even under-aggressive risk taking. Financial reporting fraud is a moral hazard problem that occurs in the first instance because of information asymmetry between CEOs and shareholders. Yet given the central role of information asymmetry in agency theory, surprisingly little research attention has been paid to differences in the likely degrees of CEO-shareholder information asymmetry arising from differing sources or across differing contexts, or to how such differences might affect the potential for fraudulent financial reporting or the effectiveness of various governance mechanisms in preventing it. These issues are particularly important given the findings that some residual CEO-shareholder goal misalignment remains even in firms with aggressive stock options incentive structures (Devers, Cannella, Reilly, & Yoder, 2007).

Management research to date has focused primarily on the motive for committing financial reporting fraud, and particularly on the potential of stock option incentive compensation to encourage reporting higher-than-actual financial performance. Studies examining CEO compensation and financial reporting fraud indicate that large stock option incentives, especially, may motivate CEOs to misreport financial results. For example, the likelihood of financial misconduct increases with a higher percentage of CEO compensation received from stock option grants (Harris & Bromiley, 2007), with a greater amount of "out of the money" CEO stock options (Zhang et al., 2008), and when boards of directors (BoDs) also

have incentive compensation plans (O'Connor et al., 2006). Thus, incentive-aligning stock option compensation intended to reduce agency monitoring costs and improve firm performance may, when taken to extremes, instead promote financial reporting fraud (Desai, Hogan, & Wilkins, 2006; see Armstrong, Jagolinzer, & Larcker, 2010, for a contrary view).

Despite the burgeoning management literature on CEO fraud, the contribution of a key antecedent condition that provides managers with the opportunity to engage in fraud—information asymmetry—has yet to be examined empirically. We address this issue first by examining the relative effects of CEO-shareholder information asymmetries resulting from differences in firm-level and industry-level structural complexities on the likelihood of fraudulent financial reporting. We then argue that a CEO will be more likely to seize the financial fraud opportunity afforded by a given level and source of information asymmetry when higher stock option ownership provides motivation for the CEO to engage in fraud. On the other hand, even motivated CEOs will be less likely to seize an asymmetry-driven fraud opportunity when monitoring of the firm's financial reporting is stringent, because such monitoring reduces opportunity and thereby decreases the CEO's willingness to attempt a fraudulent report.

We contribute to the corporate governance literature by building theory regarding how the extremely detrimental behavior of a CEO's fraudulent financial reporting can result from the CEO's opportunity to engage in fraud. Our findings indicate that having the opportunity afforded by information asymmetry may be all that is necessary for some CEOs to engage in fraudulent financial reporting. Thus, our findings point to the need to examine potential industry- and firm-level sources of information asymmetries that could promote opportunistic, "non-strategic" actions by CEOs. Furthermore, although information asymmetry by itself appears to be a sufficient condition for financial reporting fraud, the motivation provided by stock options, in some instances, enhances the propensity of CEOs to engage in fraud, while stringent monitoring reduces such propensity.

Our paper proceeds as follows: First, we review the relevant literature on information asymmetry, moral hazard, and agency theory, focusing on how these factors are related to fraudulent financial reporting. Next, we develop theory and hypotheses on why firm- and industry-based complexities are expected to increase information asymmetry and therefore the probability of financial reporting fraud. Further, we explain how stock options and audit committee monitoring likely affect the primary information asymmetry–financial fraud relationship. Our hypotheses are tested on a matched-pair sample of firms that have versus have not been publicly reported by the Securities and Exchange Commission (SEC) for financial fraud. We conclude with a discussion of our results and their implications for future research and practice.

Theoretical Background and Hypotheses

Agency theory has been the dominant theoretical lens used to examine corporate governance (Dalton, Hitt, Certo, & Dalton, 2008). A central premise of agency theory is that when the interests of agents and principals conflict, an agent may take actions that are not in the best interests of the principals (Eisenhardt, 1989). Moreover, when the quality of an agent's

actions is not easily verified by principals, the agent may engage in self-serving behavior with relative impunity (Jensen & Meckling, 1976). This agency problem is especially important for corporate governance, because firms' top managers have more and better information about the firms they lead than do owners, thereby allowing managers to pursue strategic actions that may disproportionally benefit management at the expense of stockholders. Such activity might include unnecessarily growing the firm through joint ventures (Reuer & Ragozzino, 2006), expanding internationally (Sanders & Carpenter, 1998), or expanding into new lines of business (Boyd, Gove, & Hitt, 2005; Denis, Denis, & Sarin, 1999), wherein the growth goal increases the top manager's power and salary but simultaneously reduces returns to shareholders.

The primary prescription offered to curb such goal misalignment between top managers and shareholders has been the purposeful distribution of firm equity to top managers (Dalton et al., 2008; Eisenhardt, 1989; Fama & Jensen, 1983a, 1983b; Jensen & Meckling, 1976). Scholars (and practitioners) argue that the goal alignment of owners and management increases with the distribution of equity to executives, which consequently decreases the likelihood of managerial financial misconduct (Demsetz & Lehn, 1985; Eaton & Rosen, 1983; Eisenhardt, 1988; Hall & Liebman, 1998; Shleifer & Vishny, 1997). Practitioners have widely adopted contingent stock-based incentive compensation as a means to align the interests of managers with those of shareholders and, thus, encourage managerial actions that benefit shareholders (Westphal & Zajac, 1995). While the practice of conferring contingent equity incentive compensation is now prevalent, accounting for in excess of 50% of CEO compensation (Sanders & Hambrick, 2007), empirical research does not clearly support a relationship with subsequent firm performance (Dalton, Daily, Certo, & Roengpitya, 2003; Sundaramurthy, Rhoades, & Rechner, 2005).

A contrary viewpoint has recently been offered by scholars who argue that excesses in stock-based incentive compensation can have the unintended effect of motivating some CEOs to use overly aggressive accounting practices (Desai et al., 2006) or to misreport firm financial results to the SEC (O'Connor et al., 2006) in order to artificially "prop up" earnings and thereby ensure incentive compensation is received. Such financial misconduct by executives violates shareholder trust and ultimately reduces value to shareholders. Three recent studies focusing on the effects of compensation policy on financial reporting fraud exemplify this stream.

O'Connor et al. (2006) suggested an "unprincipled agent" view of incentive stock options used for corporate governance. They found that large stock option grants to CEOs actually increased the probability of fraudulent reporting in their sample if other directors also held stock options in the presence of CEO duality, although they reduced the probability of fraudulent reporting if the CEO was not the board chair and other directors did not hold options. Similarly, Harris and Bromiley (2007) used behavioral theories to argue that lower prior performance and negative performance relative to peers also increased the probability of fraudulent financial reporting. And Zhang et al. (2008) found that CEOs were more likely to misstate earnings when they had more out-of-the money stock options and less stock ownership. Thus, empirical evidence suggests a relationship between variable compensation and financial reporting fraud.

Although evidence suggests a relationship between variable compensation and financial reporting fraud, the nature of this relationship is unclear. The use of variable compensation is an agency theory prescription to deal with potential managerial moral hazard behavior (Dalton et al., 2008; Eisenhardt, 1989). The potential of this moral hazard results from the information asymmetry that exists between shareholders and managers, and thus, information asymmetry is a primary driver of the use of variable compensation for managers (Healy & Palepu, 2001). Similarly, financial reporting fraud occurs when information asymmetry provides CEOs with the opportunity to engage in self-serving behavior. Information asymmetry therefore is a key driver of both compensation design (Healy & Palepu, 2001) and financial reporting fraud (Richardson, 2000). Understanding the role of information asymmetry in providing CEOs with the opportunity to engage in financial reporting fraud is necessary to fully uncover the antecedents to financial reporting fraud.

The Fundamental Role of Information Asymmetry

Although management research has shown that CEO compensation structure can influence malfeasance, empirical tests generally have assumed or ignored the necessary antecedent condition for such behavior—information asymmetry. A result of the separation of ownership and control in the modern corporation, "insiders" such as top managers have considerably more knowledge and understanding about a firm's operations than do outsiders such as shareholders (Seyhun, 1986, 1990). For example, top managers can directly observe and control resources (He & Wang, 2009), while shareholders cannot. Moreover, managers can make changes in investment schemes, and only the most significant of these (e.g., certain acquisitions or dispositions) require the consent of shareholders.

The existence of information asymmetry between top managers and shareholders contributes to a moral hazard risk for shareholders. That is, information asymmetry results in the potential for post-contract opportunism by top managers, such that managers can take self-serving actions that are harmful but also opaque to shareholders (Arrow, 1968). Two kinds of moral hazard arise due to the manager-shareholder information asymmetry problem. The first involves the relative opacity of the actions, behaviors, and effort exerted by top managers. Because shareholders cannot directly observe top management behaviors, nor are cause-effect relationships in the firm clear, they cannot tie actions to specific outcomes. Thus, managers can engage in activities that benefit themselves to the detriment of shareholders with relative impunity. The second moral hazard problem is hidden knowledge or information. Top managers have access to information about the firm's operations that is not available to shareholders. This is especially true of performance information. Although managers must disclose performance information to shareholders, that information is highly distilled, incomplete, and subject to manipulation (Desai et al., 2006). And when outcomes are not objective and must be communicated by management, the linkage between management actions and shareholder benefits can be even more obscure.

Several factors beyond the characteristics of the principal-agent relationship also contribute to the degree of information asymmetry facing shareholders in particular contexts. For

example, the tacit nature of much management knowledge (Kogut & Zander, 1992; Teece, Pisano, & Shuen, 1997) also contributes to information asymmetry. Managers develop in-depth, tacit understandings of a firm's resources through continual attempts at resource exploitation and development. Shareholders, in contrast, surrender control to management and, in so doing, distance themselves from the firm and thereby sacrifice any possibility for tacit understandings of daily activities. The only information shareholders usually have regarding a firm's operations consists of highly distilled, secondary data provided by regulatory filings, media reports, and security analysts (Williamson, 1979). In short, differences in proximity and experience also are sources of manager-shareholder knowledge asymmetries.

Another source of information asymmetries is in the level of complexity found in the firm and its industry. Complexity reduces transparency and increases uncertainty about actions and their outcomes (Anderson, 1999; Brown & Eisenhardt, 1997). The competition underlying industries can be considered as either more complex or more discrete (Levin et al., 1987). Complex industries have more components that account for success (Heeley, Matusik, & Jain, 2007), and in more complex industries the links between resources, competition, and performance are not direct, linear, or transparent. Analysts, investors, and other stakeholders therefore find it difficult to make a link between resources, competitive activity, and the performance of firms in complex industries. Firms competing in complex industries thus have higher levels of information asymmetry between managers and investors than do firms in less complex industries (Heeley et al., 2007). Conversely, firms in less complex, discrete technology industries have products with standard, well-known technologies, and the links between resources, competitive activity, and performance are more easily discerned. Firms in discrete industries have less information asymmetry with outsiders because it is easier for outsiders to make appropriate connections between activities (behaviors) and outcomes (performance). In sum, since operations within firms in complex industries are not transparent and it is difficult for external parties to make important connections between activities and performance, there is greater information asymmetry between shareholders and managers of firms in complex industries. Heeley et al. (2007), for example, found more underpricing of securities in complex industries as a result of greater information asymmetry.

Complexity also exists at the firm level. Organizational complexity occurs due to the difficulties arising from managing large numbers of organizational resources, routines, processes, and steps in the production of goods and services (Reed & DeFillippi, 1990). Organizational complexity becomes greater with the recombination, extension, or replication of a firm's existing routines, operations, and resources (Nelson & Winter, 1982). As the numbers of parts, processes, and routines increase within an organization, the quantity and diversity of information necessary makes decision making more cognitively difficult and costly (Mesquita & Brush, 2008). Organizational complexity therefore increases through the expansion of product lines and markets (Slevin & Covin, 1997). As a result, the more diversified a firm, the greater is its organizational complexity (Mishina, Pollock, & Porac, 2004). Greater information asymmetry exists between managers and outsiders of more diversified companies for several reasons. First, increases in organizational complexity may lead to behavioral opportunism because it is easier for management to obscure and distort internal operations so that external parties have difficulty making "cause and effect" attributions (Williamson, 1985: 57). Second, because only the financial information of the parent entity

is released, it is possible for management to shift costs and revenues across units to smooth performance (Trueman & Titman, 1988) and thereby hide action-performance relationships. Third, because the most advertised benefit of diversification is synergy, the firm's performance is not expected to be simply the sum of its parts. This provides an additional gray area that obscures the links between management actions and firm performance. In sum, the more diversified a firm, the greater the information asymmetry between managers and shareholders, the less visible the actions of management, and the more opportunity managers have to engage in malfeasance.

We have argued that the more difficult it is for shareholders to observe management behavior, the greater is the opportunity for top management to engage in fraudulent behavior such as earnings manipulation without fear of discovery. Conversely, if management actions are more easily observable by shareholders, even top managers who are highly motivated and willing to engage in malfeasance are unlikely to do so because of the high likelihood of being discovered. Therefore, increases in complexity-based information asymmetries obscure self-interested top management behaviors and thereby increase the probability of financial reporting fraud. Thus,

Hypothesis 1 (H1): The level of complexity-based information asymmetry between a firm's top managers and shareholders is positively related to the likelihood of fraudulent financial reporting by the firm's top managers.

The Moderating Role of Incentives

Stock options have been used as a common means for aligning top managers' goals with those of shareholders and thereby mitigating the agent-principal goal misalignment problem. Because the value of managers' stock options–based compensation increases when their firms' stock prices increase, top managers with enough stock option compensation will vigorously pursue their shareholders' goal of stock price appreciation. Excessive stock options can, however, have the unintended effect of increasing top managers' propensity to intentionally misstate their firms' earnings, for two reasons. First, as stock options vest the time horizon of top managers is shortened, and they are likely to "overconsume" short-term rewards (Fama, 1980). That is, management can artificially inflate short-run earnings to influence the stock price, thereby maximizing near-term compensation. Second, stock options provide top managers with unlimited upside for potential gains while limiting downside loss potential to zero (Miller & Leiblein, 1996; Zhang et al., 2008). This gives management an incentive to seek excessive risk (Sanders, 2001) that can be detrimental to shareholders.

These arguments indicate that stock options can provide managers with incentives for misrepresenting their firms' financial performance to boost near-term compensation (Harris & Bromiley, 2007) or to cover up risky bets gone wrong (O'Connor et al., 2006). Top managers will be more likely to engage in financial reporting fraud when the easy opportunity afforded by information asymmetry occurs jointly with the motivation generated by higher stock options incentive compensation. Thus, even when the cloak of information asymmetry

makes their actions less transparent, increasing stock options provide top managers with motivation that increases even further the likelihood that a CEO will fraudulently misstate firm financials.

Hypothesis 2 (H2): CEO Stock options strengthen the effect of complexity-based information asymmetry on the likelihood of fraudulent financial reporting by a firm's top managers.

The Moderating Role of Monitoring

Monitoring through an aggressive BoD is one of the more widely emphasized non-compensation-based mechanisms for mitigating undesirable agency behaviors by top managers (Dalton et al., 2008). A motivated and aggressive board is better able to observe management's behavior and to identify needed information about a firm's operations and performance (Eisenhardt, 1989). Such aggressive, effective monitoring by an engaged board generates the information needed to reduce the fundamental, complexity-based information asymmetry that causes moral hazard problems. As a result, we expect that the degree of board aggressiveness increases monitoring effectiveness and thereby mitigates agency-based moral hazard problems. For a given level of complexity-driven information asymmetry, aggressive monitoring by the board decreases a CEO's opportunity to engage in fraudulent activities.

Most important board decisions and activities take place at the committee level (Kesner, 1988). Since the agency behavior we focus on in this article is financial reporting fraud, the relevant board committee is the audit committee. The audit committee is ultimately responsible for monitoring the financial reporting process of the firm (Klein, 2002). A vigilant and aggressive audit committee will be more likely to detect financial inaccuracies before they are reported. Therefore, although complexity-based information asymmetry may afford managers the opportunity to engage in fraud, the presence of an aggressive audit committee that effectively monitors firm financial reports will decrease the likelihood that financial misrepresentation will actually occur. Thus,

Hypothesis 3 (H3): Aggressive audit committee monitoring weakens the effect of complexity-based information asymmetry on the likelihood of fraudulent financial reporting by a firm's top managers.

Methods

Company restatements of fraudulent financial reports are infrequent events, and therefore, the use of a matched-pair sample design was most appropriate for testing our hypotheses (O'Connor et al., 2006). Such designs call for matching each firm that has experienced an infrequent event at a particular time with another, similar firm that did not experience the event at that time. The matching process itself controls for a number of possible differences in each pair of firms, in a manner similar to a repeated-measures regression, and we also controlled for endogeneity. We then used a conditional logistic regression (Agresti, 2002)

that includes other statistical control variables to test for hypothesized differences across the paired firms. We describe our sampling, data collection, and analysis procedures more fully next.

Sample Selection

Our study focuses on firms that have engaged in financial reporting fraud. We used the Government Accountability Office (GAO) 2006 report to Congress, which identified 948 firms (1,360 instances) that restated their earnings due to severe accounting irregularities. This list consists of firms identified by the GAO and the SEC that restated earnings because of financial reporting fraud based upon auditors' findings, company internal audits, and government inquiries. Firms on this list are identified as particularly egregious offenders as compared to the broad group of firms that had to restate earnings for more benign reasons such as accounting rule changes. Firms identified by the GAO and the SEC include companies such as Capital One, Tivo Inc., Sears Roebuck and Company, and Xerox. This was the most recent equivalent of the lists used to examine financial reporting fraud in the studies by Harris and Bromiley (2007) and Zhang et al. (2008). The GAO database does not include the specific years misstated, but it does report the company name, ticker, announcement date, and entity that prompted the restatement (e.g., auditor, company, SEC, unknown). To gather more data about the nature of the Generally Accepted Accounting Principles violations and which specific years were restated, we examined all amended annual or SEC reports (i.e., 10-K, 10-Q, or 8-K) for each firm on the GAO's list to confirm the restatement and identify the period being restated. We identified amended annual reports for 618 firms that could be linked to the restatement identified by the SEC. We then used the *CRSP*, *Compustat*, and *Execucomp* databases to collect data on stock prices, firm financials, and top manager compensation. For firms not in these databases, we collected the information directly from their SEC filings. An additional 165 firms did not have any SEC (proxy) filings with Top Management Teams (TMT) compensation information. The final sample therefore included 453 firms that restated their earnings during this period and had complete information. Because all the firms in sample had stock- and performance-based compensation for the period being restated, the CEOs benefitted financially from the misstated earnings.

Matching Procedure

Researchers have used matched-pair designs in other financial misconduct studies (e.g., Arthaud-Day, Certo, Dalton, & Dalton, 2006; Denis, Hanouna, & Sarin, 2006; Erickson, Hanlon, & Maydew, 2006; Harris & Bromiley, 2007; Kinney, Palmrose, & Scholz, 2004; O'Connor et al., 2006). We closely matched each firm that had been identified as restating previous, fraudulent financial reports with a similar but non-restating company, based primarily on size and year of the fraudulent reporting. Similar to Harris and Bromiley (2007) and O'Connor et al. (2006), we restricted our matched-pair sample to publicly traded, U.S.-based firms. Firms without complete information in the Compustat and Execucomp databases or firms trading as American depositary receipts (ADRs) were not eligible to be

matches for the misreporting firms. The matched firm for every restating firm consisted of the U.S. publicly traded firm closest in size (based on total assets) for the given year. Unlike Harris and Bromiley (2007) and O'Connor et al. (2006), however, our matching criteria did not include industry. This is because industry is one of the independent variables of interest in our study and is accounted for in the analyses. But with the exception of industry, our matching criteria are comparable to those used by Harris and Bromiley (2007) and O'Connor et al. (2006). All independent and control variables were measured for the year prior to the financial misstatement.

Dependent Variable

Restatement. Our dependent variable is whether the firm restated its earnings due to fraudulent accounting irregularities (as identified by the GAO 2006 report) between the years 2002 and 2005 inclusive. The restatement variable is binary and is coded as 1 if the firm was listed in the GAO report and 0 otherwise.

Independent Variables

We captured complexity-based information asymmetry using both an industry measure and a firm-level measure. Industry-level information asymmetry was measured using industry complexity, while firm-level information asymmetry was captured through the degree of firm diversification.

Industry complexity. Industry complexity has historically been defined as the amount of heterogeneity present within an industry (Aldrich, 1979), which captures the uncertainty that arises as a result of intraindustry competition. We build on Dess and Beard's (1984) model that captures heterogeneity in terms of industry concentration. Specifically, we operationalized industry complexity as the inverse of the industry four-firm concentration ratio. Highly concentrated industries are argued to have a high degree of strategic similarity because they contain a small number of relatively homogeneous firms (Miles, Snow, & Sharfman, 1993). Such industries, with fewer competitors, have more standardized norms of competition and impose fewer information burdens on competitors and external parties (Palmer & Wiseman, 1999). Because all the participants are well versed with each other, these industries are less complex for managers and observers. Conversely, less concentrated industries have many heterogeneous participants, which results in increased competition and unpredictability. Such industries have high complexity due to increased information requirements for managers. Therefore, consistent with prior research (e.g., Boyd, 1995; Keats & Hitt, 1988; Palmer & Wiseman, 1999; Rasheed & Prescott, 1992), we calculated industry complexity as the inverse of the four-firm industry concentration ratio. Specifically, we first calculated the total sales of the industry by summing the sales of all firms in the industry listed in Compustat. Next, we identified the four largest firms, ranked by sales, in each industry. The four-firm concentration ratio was then calculated as the ratio of the sales of the four largest

firms divided by the total industry sales. Essentially, this ratio is the proportion of sales in the industry accounted for by the four largest firms. The inverse of this ratio is our measure of industry complexity. We defined industries based on three-digit Standard Industry Classification (SIC) codes.

Firm complexity. Consistent with our theoretical discussion, we measured firm-level complexity using a company diversification index. We calculated Palepu's (1985) entropy-based diversification index using each company's sales breakdowns as reported in Compustat.

Unexercised options. We identified the number of unexercised options owned by a CEO in a particular year, as reported in the firm's annual 10-K report.

Board monitoring. We measured the board's ability to effectively monitor financial reporting by the number of *audit committee meetings* held in a particular year (Vafeas, 1999). Prior research has argued that the board's functions occur at the committee level (Kesner, 1988), with the audit committee being particularly relevant to financial issues such as earnings accuracy (Xie, Davidson, & DaBalt, 2003).

Control Variables

In addition to industry- and firm-level complexities, information asymmetry between management and outsiders can also arise from firms possessing intangible resources such as knowledge (Ndofor & Levitas, 2004). Following He and Wang (2009), we controlled for information asymmetry arising from intangible resources using R&D intensity (Aboody & Lev, 2000). Prior research has established the effect of CEO compensation on behavior (Devers et al., 2007). We also controlled for the total compensation paid to the CEO each year. Since our measure of industry complexity is based on a measure of industry concentration, consistent with prior literature, we controlled for the number of firms in each industry.

Although CEOs have considerable discretion in guiding their firms, there are a number of control structures that can limit their scope of action. Research has shown that more powerful CEOs are more likely to have the ability to circumvent such measures (Finkelstein & Hambrick, 1989; Ocasio, 1994; Shen, 2003). We controlled for this with several variables. First, the level of power associated with the CEOs is in part reflected by whether or not they also serve as board chairpersons. We therefore controlled for *CEO duality.* Furthermore, longer tenured CEOs have more discretionary power than do newer ones (Finkelstein, 1992). Thus, we also controlled for *CEO tenure.* In addition, we controlled for the *CEO's equity* in the firm by including the percentage of shares outstanding owned by the CEO. We controlled for *audit committee independence*, which reflects the audit committee's capacity to monitor the firm's financial operations (Dalton et al., 2008). Audit committee independence was measured by the number of audit committee members not appointed to the board by the current CEO (Pollock, Fischer, & Wade, 2002; Westphal & Zajac, 1998; Xie et al., 2003). We also controlled for the entire BoD's vigilance by including the number of BoD meetings held each year and for BoD independence through the number of outside directors.

Performance shortfalls have been shown to also affect the propensity of firms to misstate their earnings (Harris & Bromiley, 2007). We therefore controlled for a shortfall from the previous year's performance by using the year-to-year *decline in the firm's return on assets (ROA).* This was calculated by subtracting the ROA for the given year from the ROA of the previous fiscal year. A higher number indicates the current year ROA is worse than the previous year ROA. Proir research has shown that a change in firm performance often leads to opportunistic actions by management, including financial misconduct (Arthaud-Day et al., 2006; Harris & Bromiley, 2007; O'Connor et al., 2006; Zhang et al., 2008). To ensure causal attributions, all independent and control variables are measured for the year prior to the misstated earnings ($t - 1$).

Table 1 reports descriptive statistics and correlations for the variables included in this study. All variables included in interactions were mean centered (Aiken & West, 1991) and are reported as such in Table 1.

Data Analysis and Results

Our main objectives were to test the effect of complexity-induced information asymmetry on the probability of fraudulently misstating earnings, and also to test the hypothesized moderating roles of CEOs' unexercised options and monitoring by the BoD. CEOs' compensation, however, is also influenced by (among other variables) information asymmetry. Indeed, there is a vast literature establishing the effect of information asymmetry on governance and compensation structure (e.g., Healy & Palepu, 2001; He & Wang, 2009). This indicates that decisions concerning the moderating variables—represented by the number of unexercised options held by the CEO and the number of BoD audit committee meetings—could be endogenous. We therefore used a two-stage model (Greene, 2000) to test our hypotheses. The first stage consisted of predicting unexercised options at time ($t - 1$) and audit committee meetings, based on industry complexity, firm complexity, options granted, performance, CEO tenure, and other governance variables at time ($t - 2$). The predicted values from stage one along with the other independent variables were then used in stage two. In stage two, we used conditional logistic regression (Agresti, 2002) to test our hypotheses, because it is most appropriate for analyzing matched-pair models with a binary dependent variable (Hoetker, 2007; Press & Wilson, 1978).

Table 2 reports our conditional logistic regression results. Model 1 represents the control variables only, Model 2 includes main effects, Model 3 presents the interaction effects, and Model 4 presents the odds ratios of the complete model. All models are statistically significant. All variables used in interactions (number of unexercised options, audit committee meetings, diversification, and industry complexity) were mean centered prior to the analyses (Aiken & West, 1991).

Hypothesis 1 predicted a positive relationship between the degree of complexity-based information asymmetry and the probability of financial restatement due to fraudulent reporting. Information asymmetry was measured at the industry level by industry complexity and at the firm level by firm complexity. The coefficients for both measures of information asymmetry—industry complexity (.47, $p < .05$) and firm complexity (.54, $p < .01$)—are positive

Table 1
Means, Standard Deviations, and Correlations

Variable	Mean	Standard Deviation	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1 Restatement	.50	.50														
2 CEO Duality	.59	.49	.05													
3 CEO Tenure	7.59	8.42	.00	.29***												
4 CEO Total Compensation	1926	4762	–.15***	.07*	.04											
5 CEO Shares Owned	5.86	10.94	.19***	.22***	.32***	–.12***										
6 Board Independence	5.92	2.28	–.04	–.02	–.15***	.15***	–.22***									
7 Number of Board Meetings	7.17	3.67	.07*	–.09*	–.20***	–.02	–.11***	.09**								
8 Audit Committee Independence	.33	.39	–.11***	–.24***	–.40***	–.02	–.24***	.13***	.08*							
9 R&D Intensity	.07	.25	–.03	–.01	–.01	–.03	.01	–.07*	.05	.02						
10 Decline in ROA	–1.57	57.12	–.03	–.03	.01	.02	.01	–.03	.02	.03	.01					
11 Number of Firms in Industry	152	257	–.09**	–.06	–.10**	–.08*	–.05	–.10**	.09**	.05	.32***	.00				
12 Number of Audit Committee Meetings	6.19	1.01	.01	.04	–.20***	.09**	–.38***	.14***	.09**	.05	–.02	.02	–.02			
13 CEO Options	1006	1489	–.05	.07*	.08*	.06	–.12***	.03	.14***	–.03	.04	.01	.05	.20***		
14 Industry Complexity	1.63	.61	.02	–.02	–.10**	–.03	–.10**	.10**	.14***	.05	.11***	–.10**	.57***	.03	.04	
15 Firm Complexity	.49	.57	.21***	.04	–.01	.02	.02	.17***	.08*	–.03	–.09**	.03	–.08**	.22***	.07*	–.04

Note: $N = 906$. ROA = return on assets.
*$p < .05$. **$p < .01$. ***$p < .001$.

Table 2
Results of Conditional Logistic Regression for Firm Financial Restatements

	Model 1	Model 2	Model 3	Odd Ratio
CEO Duality	.28	.35	.25	1.29
CEO Tenure	–.02*	–.02	.01	1.00
CEO Total Compensation	–.00	–.00	–.00	.99
CEO Shares Owned	.03**	.02*	.04*	1.04*
Board Meetings	.04	.04	.08**	1.09**
Board Independence	–.02	–.11*	–.06	.93
Audit Committee Independence	–.38	–.46	–.68*	.50
R&D Intensity	–3.02	–2.30	–1.39	.24
Decline in ROA	–.03*	–.04**	–.04*	.95*
Number of Firms in Industry	–.001	–.001**	–.001*	.99*
CEO Unexercised Options		–.001*	–.001***	.99***
Audit Committee Meetings		.05	.75*	2.13*
Industry Complexity		.47*	.40*	.40*
Firm Complexity		.54**	.71*	1.48*
Unexercised Options × Industry Complexity			.01***	1.00***
Unexercised Options × Firm Complexity			.00	1.00
Audit Committee Meetings × Industry Complexity			–.21	0.80
Audit Committee Meetings × Firm Complexity			–.62**	.53**
χ^2	28.61**	41.45**	49.72**	
Change in χ^2		12.84	8.27	
McFadden's Pseudo R^2	.13	.21	.27	
–2 Log Likelihood	147.41	118.21	118.21	
Hit Rate	62%	66%	69%	

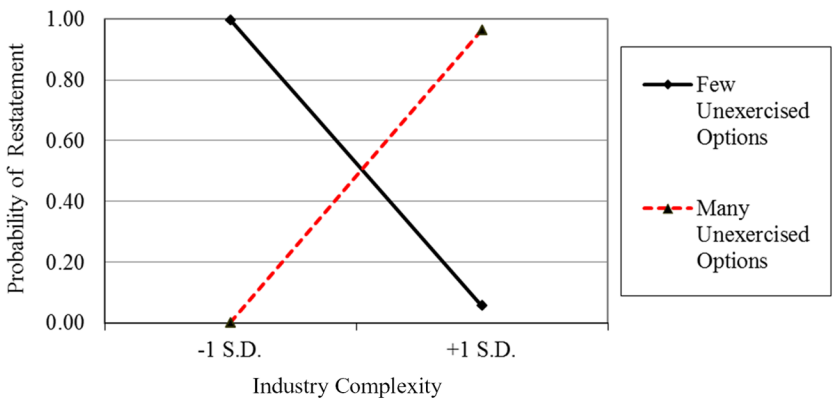
Note: $N = 906$. ROA = return on assets. Odds Ratio column results are for Model 3.
*$p < .05$. **$p < .01$. ***$p < .001$ (one-tailed significance tests for Model 2 and Model 3).

and statistically significant as predictors of the likelihood of fraudulent financial reports (Model 2). These results provide strong support for H1. A Wald test was run to determine whether industry complexity and firm complexity have similar effects on the likelihood of a firm reporting fraudulent financial information. No statistical difference was found between the coefficients (χ^2 (1) = 0.59, $p > .44$), indicating that the effects are of similar magnitude.

Hypothesis 2 predicted that a greater number of unexercised options owned by the CEO would strengthen the positive relationship between information asymmetry and the probability of financial misreporting. Model 3 provides the results for this hypothesis. From Model 3, the coefficient for the interaction term between unexercised CEO stock options and industry complexity is positive and significant (.005, $p < .001$), thus providing support to H2. The coefficient for the interaction term between CEO options and firm complexity, however, is not significant (.002, $p < .1$). As such, H2 receives only partial support.

Hypothesis 3 predicted that more stringent audit committee monitoring would weaken the positive relationship between information asymmetry and the probability of financial misreporting. From Model 3, the coefficient for the interaction term between audit committee meetings and firm-level complexity is negative and significant (–0.62, $p < .01$). This provides support for H3. However, the coefficient for the interaction term between audit

Figure 1
The Moderating Influence of CEO Unexercised Options on the Relationship Between Industry Complexity and Probability of Restating Earnings



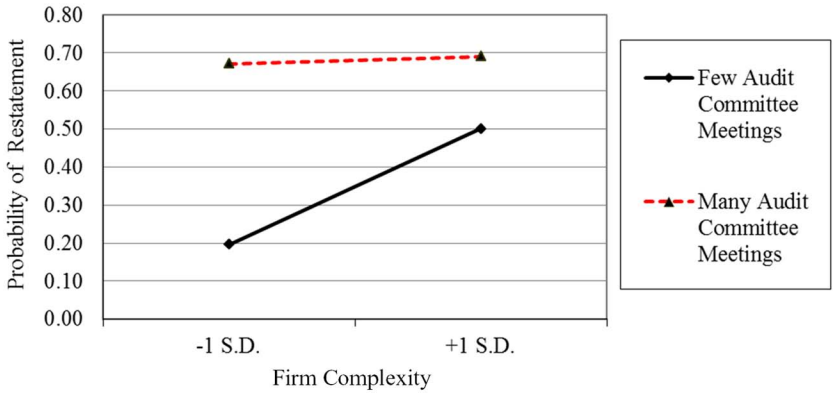
committee meetings and industry complexity is not significant. Thus, H3 is also only partially supported. To see if the moderating effect of governance is limited only to incentives (options) and monitoring (audit committee), in supplementary analyses we tested the interaction effects of both complexity measures with the other governance measures used as control variables.[1] None of those interactions was significant, indicating that the relationship between information asymmetry and fraudulent financial reporting is moderated primarily through incentives and more stringent monitoring.

The proper interpretation of these interactions requires an examination of the interaction graphs shown in Figures 1 and 2. Figure 1 reveals that as industry complexity increases, the probability of fraudulent financial reporting increases for firms with CEOs having more unexercised options but is lower for those with fewer unexercised options. Conversely, Figure 2 shows that as firm complexity increases, the probability of fraudulent financial reporting also increases for firms with less frequent audit committee meetings. These results support the hypotheses that more CEO options increase the motivation for financial reporting fraud when opportunity from industry complexity is high, and more vigilant monitoring reduces the probability of financial reporting fraud even when the underlying opportunity due to information asymmetry from industry complexity is high.

Discussion

This study extends the current research on financial misconduct (e.g., O'Connor et al., 2006; Zhang et al., 2008) by examining the relative effects of complexity-induced information asymmetries on the likelihood of fraudulent financial reporting by top executives. Financial misconduct is a qualitatively different and potentially more egregious form of

Figure 2
The Moderating Influence of Number of Audit Committee Meetings on the Relationship Between Industry Complexity and Probability of Restating Earnings



opportunism than are simple shirking or the manipulation of strategic actions, because honest financial reports are fundamental to robust and efficient equity markets.

We contribute to the management literature by arguing that although previous research has linked CEO power and incentive compensation to fraudulent earnings manipulations (O'Conner et al., 2006; Zhang et al., 2008), these are not sufficient conditions for financial reporting fraud. Instead, information asymmetry is the fundamental, yet generally little examined, antecedent condition required, and the greater the asymmetry the greater is the likelihood of top management fraud. These results support our contention that when shareholders have less information about the firm, managers have greater opportunity to engage in fraudulent activities such as earnings management and financial misstatements (Richardson, 2000), as suggested by those who argue that managers hold considerably more knowledge about the firm's operations than do shareholders (Seyhun, 1986, 1990).

The delegation of managerial control in exchange for residual claims induces agency costs because the managerial specialization required for efficiency is the start toward increasingly complex firms. More firm-level complexity results in greater information asymmetry that can be capitalized upon by self-serving executives, just as more industry-level complexity does. Such information asymmetry provides opportunities for fraud, without which the motivation provided by incentive compensation can't be exploited by "unprincipled" agents.

Moreover, our moderating findings indicate that not all contexts of similar information asymmetry must yield similar fraud likelihoods. Active audit committee monitoring, for example, reduces the positive effect of industry complexity–induced information asymmetry on the likelihood of financial fraud by top managers. Thus, corporate governance can play an important role. This finding is consistent with the New York Stock Exchange and National Association of Securities Dealers Blue Ribbon Commission on Financial Fraud's

conclusion (SEC Press Release, 1998) that aggressive monitoring by audit committees is the first line of defense against financial reporting fraud.

Our results for financial fraud can be compared to those of He and Wang (2009) regarding firm performance. They studied the effects of information asymmetry, represented by the firm's tacit knowledge base, on firms' stock market performance and evaluated the moderating effects of compensation and monitoring on that focal relationship. For their multiyear sample of 215 manufacturing firms, they found that information asymmetry was positively related to firm performance, and also that compensation strengthened and monitoring weakened the information asymmetry–performance relationship. Viewed together with our results, this would imply that while information asymmetry is associated with increased firm performance, it also increases the likelihood of fraudulent financial reporting by top management. Similarly, while stock options positively affect and board monitoring negatively affects stock market performance as information asymmetry increases, they also positively and negatively affect the likelihood of financial fraud. In short, the He and Wang (2009) moderating results for the stock market performance dependent variable are the same as our moderating results for fraudulent financial performance.

To gain further information on how our results for fraudulent financial reporting might be related to those of He and Wang (2009) for stock performance, we performed a supplementary analysis using stock market performance at *t* (the restatement year) as the dependent variable (i.e., the same measure used by He and Wang, 2009), to see if the results in our sample for market performance would be similar to those found by He and Wang. These results are presented in Table 3. Our Table 3 results show that the main effects of CEO options and BoD monitoring (number of board meetings) on subsequent market performance are positive and negative, respectively, in our sample. These results are somewhat consistent with those of He and Wang (2009), who found that tacit knowledge-based information asymmetry was positively related to financial performance in their sample and that CEO options enhanced that relationship while BoD monitoring suppressed it. Thus, our analyses provides some support for He and Wang's (2009) findings while also showing that the same factors that influenced stock market performance in their sample and in our supplementary analysis also contributed to increased likelihoods of fraudulent financial reporting in our main analysis.

While our supplementary analysis provides some support for the earlier He and Wang (2009) work and adding confidence in our results because we found both the fraud effects and the opposite market effects in our sample, any conclusions drawn from comparisons of our findings with He and Wang (2009) require extreme care for several reasons. First, He and Wang (2009) focused on information asymmetry associated with the tacit and idiosyncratic nature of a firm's innovative assets. Prior research has argued for performance advantages provided by the information asymmetry surrounding the creation and deployment of such assets (Ndofor & Levitas, 2004). Our study, on the other hand, focused on information asymmetry emanating from industry- and firm-level complexities, and prior research has shown that such complexities increase moral hazard and thus agency costs (Kim, Hoskisson, & Wan, 2004). Thus, the effect of information asymmetry on a firm's market performance or fraud likelihood may depend upon the source of that information asymmetry. Second, while He and Wang's (2009) sample consisted solely of manufacturing firms, our sample

Table 3
Results of Regression for Market Performance ($t + 1$)

	Model 1	Model 2	Model 3	Beta
Constant	.63**	.53**	.53**	
CEO Duality	.07	.04	.04	.03
CEO Tenure	.01	.00	.00	.00
CEO Total Compensation	.00*	.00*	.00**	.10
CEO Shares Owned	–.01**	–.00	–.00	–.03
Decline in ROA	–.00	.00	.00	–.00
Audit Committee Independence	.05	.05	.05	.03
R&D Intensity	1.02***	1.04***	1.04***	.30
Number of Board Meetings	–.05*	–.01*	–.01*	–.07
Board Independence	–.06***	–.05***	–.05***	–.16
Number of Industry Firms	.00***	.00***	.00***	.17
Options Granted CEO		.00	.00*	.09
Audit Committee Meetings		.10***	.11***	.16
Industry Complexity		–.14***	–.13**	–.12
Firm Complexity		–.18***	–.17***	–.14
Audit Committee Meetings × Industry Complexity			–.01	–.01
Audit Committee Meetings × Firm Complexity			–.02	–.02
Options Granted CEO × Industry Complexity			–.00*	–.07
Options Granted CEO × Firm Complexity			–.00	–.01
R^2	.16	.20	.21	
Adjusted R^2	.15	.19	.19	
Change in R^2		.04**	.00	
F	13.67**	12.95**	10.29**	

Note: $N = 906$. ROA = return on assets. Beta column results are for Model 3.
*$p < .05$. **$p < .01$. ***$p < .001$.

has other firm types. And third, our sample is greatly over-weighted with 50% firms that fraudulently reported financial results. In such samples any market or accounting measures of performance cannot be considered to have even typical levels of accuracy.

Our study and the study of He and Wang (2009) produced differing recommendations for practitioners: Theirs indicate that stock options are positive and board monitoring negative for stock market performance, and ours indicate that stock options increase and board monitoring decreases the likelihood of fraudulent financial reporting. These competing prescriptions raise the Goldilocks-like question, What levels of options and BoD monitoring, at each level of information asymmetry, will produce the best balance between market performance and fraud likelihood? This question is similar to issues raised long ago by Hedberg, Nystrom, and Starbuck (1976) about organizations "camping on seesaws." That is, organizational success requires numerous balancing acts. Our results suggest that stock options can be effective up to some level, beyond which the likelihood of fraud (or other excessive risk taking (see Sanders & Hambrick, 2007) will become too great. Similarly, board monitoring can be effective up to some level, beyond which it may reduce flexibility and stifle performance (He & Wang, 2009). This calls for careful judgment on the part of practitioners and, especially BoDs, and also indicates the need for continued research.

Limitations and Future Research

As with any study, ours has limitations. First, our arguments focus on the potential for opportunism that emanates from industry- and firm-based complexities. Complexity may also influence outcomes in a similar way due to the bounded rationality of managers. That is, as industries and organizations become more complex, the information managers must gather, analyze, and use in decision making increases exponentially and presents difficulties for CEOs and other top managers (Mesquita & Brush, 2008). Thus, while our sample selection ensured that the misstated earnings we analyzed were the result of potential fraud, it is also possible that misstated earnings could be as a result of "honest incompetence" (Hendry, 2002) arising from increasing complexity rather than intentional fraudulent activity. This is less likely, however, because fraudulent misstatements are hardly ever misstated in the downward (i.e., below actual) direction. Nevertheless, future research could examine a wider array of misstated earnings to parcel out the relative effects of bounded rationality due to error, incompetence, or perhaps wishful thinking versus opportunism-based fraud.

Second, we only considered two possible sources of information asymmetry: industry- and firm-level complexity. Future research should consider other sources of information asymmetry that could increase the opportunities for fraud. This may allow for research to be conducted that examines Ghoshal and Moran's (1996) assertion that deviant executives will continually find new ways to take advantage of their principals. Third, our study focuses on earnings restatements, which, by their nature, make it difficult to evaluate the precise size and scope of fraudulent activities by top managers. When a restatement occurs, the likelihood of a further restatement also increases (Zhang et al., 2008), and because of this, we could not be confident enough in the amount restated to confidently identify frauds of different absolute or relative sizes. This could be a fruitful area for future research.

Fourth, we only include governance mechanisms that have been shown in prior research to influence earnings misstatement. There are, however, a broader set of governance mechanisms that may also influence CEO behavior. For example, we measure monitoring using board and audit committee independence and number of meetings. However, ownership by large blockholders and certain institutional owners (Hoskisson, Hitt, Johnson, & Grossman, 2002), the market for corporate control (Gompers, Ishii, & Metrick, 2003), capital structure (David, O'Brien, & Yoshikawa, 2008), and the reputation of board members (Zajac & Westphal, 1996) all have been shown to have a constraining effect on CEO behavior. Future research could enrich the field by examining how these governance mechanisms interact with information asymmetry to influence CEO behaviors.

Finally, our measure of industry complexity is based on the four-firm concentration ratio of the industry. Although this is the predominantly used measure in the literature, other measures are also present. For example, Boyd (1995) used the Herfindahl index—measured as the sum of squared market shares of all firms in the industry—to calculate industry complexity. Heeley et al. (2007) measured industry complexity using a binary variable based on International Standard Industry Classification (ISIC) codes that capture the ease with which external parties such as analysts, investors, and other stakeholders make a link between resources, competitive activity, and the performance of firms in the industries. We reran our analyses using both alternative measures with no substantive difference in results. The presence of multiple measures, however, raises the issue of multiple sources of complexity

within the industry. While our measure and that of Boyd (1995) capture complexity resulting from competition within the industry, Heeley et al.'s (2007) measure captures complexity originating from the nature of operations of firms in the industry. Other possible sources of industry complexity also include technological complexity and regulatory/legal complexity. Future research can advance the field by investigating if the different sources of complexity give rise to the same levels of information asymmetry and whether they would have the same impact on both managerial and firm behavior.

Conclusion

We have argued that management scholars should investigate opportunity construct more rigorously, in addition to executives' motives and willingness, because opportunity is both a necessary and a sufficient condition for financial malfeasance. Moreover, future studies will require the testing of each construct's main and interactive effects if the inconsistencies among prior results are to be resolved.

Our study indicates that principals must continuously re-evaluate the combination of controls to monitor agents and incentives used to align interests and reduce moral hazard. For instance, Zhang and colleagues (2008) discussed restricted stock as a potential alternative to stock options as incentive-based compensation because it has different risk-reward characteristics. Other possibilities include the use of "clawback" provisions where executives would be forced to return incentive compensation if financial manipulation is discovered, and the rewarding of bonuses paid on the basis of long-term metrics rather than annual returns. We hope that future researchers will be able to take steps toward identifying the appropriate fulcrum points for options and BoD monitoring that, at each level of information asymmetry, most effectively balance concerns for raising performance with concerns for reducing the likelihood that "unprincipled agents" (O'Connor et al., 2006) will be able to serve their own interests at the expense of their shareholders.

Note

1. We thank an anonymous reviewer for this suggestion.

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